

Abstract

SYSTEM, RECEIVER AND METHOD OF OPERATION FOR SPREAD OFDM
WIRELESS COMMUNICATION

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A system (100), receiver (160-190) and method of
operation for spread OFDM wireless
communication (single user OFDM-CDMA with
cyclic-prefix) by: equalizing the received
10 spread OFDM signal (y) and splitting it into
first and second portions (\hat{s}_1, \hat{s}_2); making a
decision on the second portion and subtracting
the second portion from the received signal to
produce a first difference signal; processing
15 the first difference signal to recover the
first portion of the received signal in which
symbol interfering terms of the second portion
are substantially reduced; making a decision on
the first portion and subtracting the first
20 portion from the received signal to produce a
second difference signal; and processing the
second difference signal to recover the second
portion of the received signal in which symbol
interfering terms of the first portion are
25 substantially reduced. The process may be
iterated extensively at this stage. In a second
stage, the recovered received signal is split
into a greater number of portions (e.g., 4),
and processed similarly to further reduce
30 interference. The same mechanisms can be
applied to blocks of reduced size (divided into

8, 16 etc.) leading to a higher resolution of the decoding and a tree-like structure.

Also, minimum mean square error equalization is performed by multiplying by a first diagonal matrix having elements
5 dependent on channel coefficients; and multiplying by a second matrix which is a subset of a Walsh Hadamard matrix.

This provides low arithmetical complexity, it is possible to adjust the number of iterations to be performed based
10 on a performance/complexity tradeoff, it can be viewed as a simple extension of current OFDM systems, and it yields a significant PER performance enhancement (e.g., 3dB)
(FIG. 1&2 to accompany abstract)